ABSTRACT OF THE DISCLOSURE

Exposure of colorectal cancer (CRC) cells to ionizing radiation results in a growth arrest, with cells blocked in both the G1 and G2 phases of the cell cycle. The G1 block has been shown to be due to the p53-mediated induction of the cyclin-dependent kinase inhibitor $p21^{WAF1/CIP1/SDI1}$, but the basis for the G2 arrest is unknown. Through a quantitative analysis of gene expression patterns in CRC cell lines, we have discovered that *14-3-3σ* is strongly induced by γ-irradiation and other DNA-damaging agents. The induction of *14-3-3σ* is mediated by a p53-responsive element located 1.815 kb upstream of its transcription start site. Exogenous introduction of *14-3-3σ* into cycling cells results in a G2 block similar to that observed following irradiation. These results document a molecular mechanism for G2/M control that is regulated in human cells by p53.